# A TREATISE

ON

# BENDING ROLLS,

AS MADE BY

## WM. SELLERS & CO.,

1600 Hamilton Street, Philadelphia, U.S.,

MANUFACTURERS OF

MACHINISTS', FOUNDERS', SMITHS', AND BOILER-MAKERS' TOOLS,

SHAFTING AND MILL GEARING,

RAILWAY TURNING AND TRANSFER TABLES,

PIVOT BRIDGES, ETC.;

MANUFACTURERS OF THE

MOST IMPROVED FORMS OF INJECTOR BOILER-FEEDERS,

AND

SOLE MANUFACTURERS OF THE SELF-ADJUSTING INJECTOR.

PHILADELPHIA.
1884.

Copyright, 1884, by Wm. Sellers & Co.

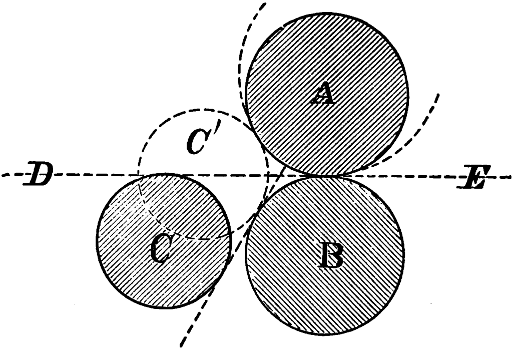
PRINTED BY
J. B. LIPPINCOTT & CO.,
PHILADELPHIA.

# BENDING ROLLS.

WE have recently made some important changes in the method of driving rolls for bending sheet and plate iron for boiler- or shipmakers' use. Before describing the tools, we would call attention to the principle involved in machines for bending plates of metal. The primitive bending machine still in general use consists of two rolls laid side by side and a third roll placed over these two, the top roll being adjustable vertically and being immediately over the hollow between the two lower rolls. In hand-power bending machines set up on this plan the levers to turn the rolls are usually attached to one end of one of the bottom rolls and the opposite end of the top roll. This plan is not admissible when rolls set up in pyramidal form are driven by power. Then it becomes necessary to gear the two bottom rolls, and frequently they are united by small pinions at one end. In such a case one bottom roll is driven, and that roll drives the other one through the pinions. The strain on the pinions coupling these rolls together is very great. The system is objectionable on this account and as involving much useless friction. We make hand-power bending rolls with the rolls set in pyramidal form, but never apply gearing and power to rolls so placed.

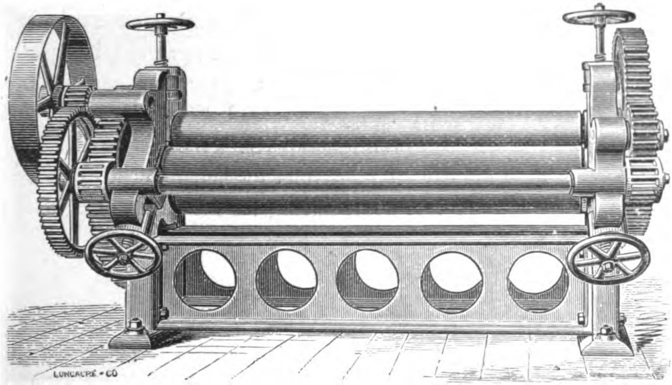
We are clearly of the opinion that the proper way to set bending rolls is to arrange two pinching rolls, one directly over the other, and both driven; then to place the bending roll to one side of the lower roll, with the housings so made as to guide the bending roll diagonally past the lower roll towards the upper one, as is shown in Fig. 1, page 4, in which the top roll A is placed directly over the bottom roll B. C is the bending roll adjustable towards A in the direction of the diagonal dotted line. When roller C is down far enough to have its top level with the top of roller

FIG. 1.



B, then a plate, D E, can be passed between rolls A and B without being curved; but when C is raised towards the position indicated by dotted circle C′, then the plate will be curved. We make several sizes and kinds of bending machines embodying the principle as shown above. In some we put bending rolls on both sides of roll B, thus making the set to consist of four rolls. Our most recent improvement will be found illustrated and described on page 7 as our 10-foot power bending rolls.

Fig. 2.



## POWER BENDING ROLLS.

Arranged with two pinching rolls, set one directly over the other, the bending roll movable at an angle to the pinching rolls. Pinching rolls geared at opposite ends, so that they are always correctly in gear while driving. The top pinching roll removable through housings at one end, so as to permit the bending up of flues. Over-head shaft with ball and socket hangers and three pulleys, 24 inches diameter, 5 inches face, for reversing by open and cross belts, which pulleys should make 180 revolutions per minute, requiring on main line a driving pulley 15 inches face.

ROLLS arranged as above present the advantage of being able to squeeze the plate between the two pinching rolls and bend nearer to the edge of sheet than can be done with three rolls set in the usual manner, *i.e.* two on a horizontal plane and one over the space between these rolls.

**Bend near to edge.**

We are prepared to make Power Bending Rolls for

For ship work.

ship work, with four rolls in the system adjustable by power in height; these rolls are massive and can be used for bending plates 1 inch thick and 14 feet wide; will bend cylindrical or in-wind, while the sheet is passing straight (not diagonally) through the machine. These rolls can also be used for straightening plates in a much more thorough manner than can be done with hammers: they are intended for ship work. All the rolls have centre supports. We also have designs of a similar set of 4 rolls for boiler work, to take in plates 11 feet wide, having all the advantages of the above.

For large boiler plates.

## BENDING ROLLS.

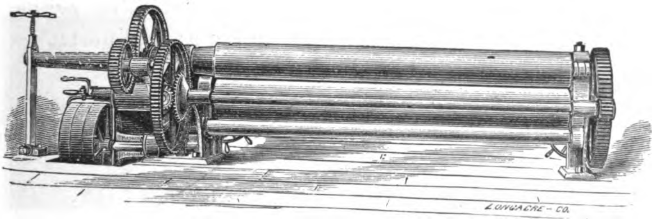
Made of best gun iron, for boiler plate; with strong iron frame, self-supporting top, and side rolls adjustable, to set on floor without foundations, with rolls 5 inches in diameter, 4 feet ~~6 inches~~ long.

Same machine with all the rolls adjustable, housings and boxes complete, fitted to bolt on foundations.

Rolls 8 inches diameter, 6 feet 1 inch long.
" 9 " " 6 " 1 " "
" 9 " " 8 " 1 " "

THE first machine described in the above specification is intended for tank work, bending iron of not over $\frac{3}{16}$ inch thick; is admirably adapted for tank work, and can be used to advantage in coppersmith shop for rolling up pipes. The larger rolls are of the usual hand-working kind, and require pits at each end of the rolls for the lever arms to work in. The housings are independent, and must be secured to foundation.

**Fig. 3.**


LONGACRE - CO.

## 10-FOOT POWER BENDING ROLLS.

Arranged with two pinching rolls, set one directly over the other, the bending roll movable at an angle to the pinching rolls.

Pinching rolls geared at opposite ends, the power being transmitted through a set of equalizing wheels, so as to rotate the rolls in proper relation to each other, and thus avoid any calendering motion on curved plates. The top roll made to tilt up at one end for the ready removal of flues, or sheets rolled into a full circle.

Arranged with patent belt shifting gear the same as on our planers and hoisting machines. Pulleys, 30 inches diameter, 4½ inches face; pulley on line to drive the machine must be 13 inches face, turned straight, and of such diameter as will give a speed of 178 revolutions to a 30-inch pulley.

AFTER much experience with machines for bending plate we designed this tool, and have introduced in it the improvements alluded to on page 3. It will be observed that the shaft which conveys the motion from one roll to the other is arranged with a set of equalizing gear wheels. The bevel pinions equalize the strain upon both rolls. When a plate of iron, ¾ inch thick, is curved into a cylinder, say 4 feet in diameter, it will be found that the

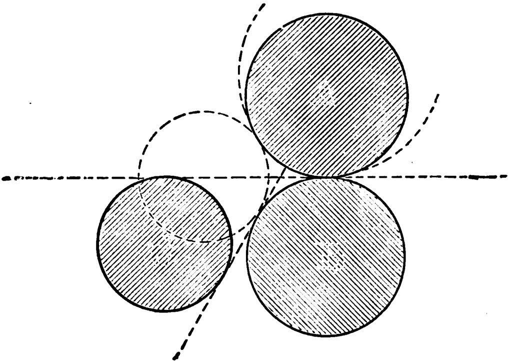
**Equalize motion.**

difference between the outside and inside circle of the sheet will cause a motion of the equalizing pinions of about ⅓ of their circumference. Rolls geared in this manner require less power to drive them than would be needed to drive rigidly geared rolls of the same size and length. This machine can be used to straighten sheets as well as bend them.

**Straightening sheets.**

The above arrangement of rolls is shown below in section.

FIG. 4.



# POWER BENDING ROLLS FOR SHIP WORK.

Arranged with two pinching rolls placed one over the other, and having two bending rolls, one on each side, moved up at an angle towards the pinching rolls. The rolling or pinching rolls are 16 inches in diameter, 14 feet long, and have three supports. The bending rolls are 12 inches in diameter, and these too have three supports,—that is to say, the end journals of the rolls and a centre support. All the movable rolls are moved up or down by power. The top roll of the pinching pair is stationary. The lower roll moves up to it to clamp the plate. The movement of these rolls is by means of worm wheels and worms, and the raising mechanism of the bending rolls is so arranged as to permit the three bearings of each roll to be set up at one time and at the same rate of speed, or to be separated, and thus to permit the rolls to be set in-wind to the required curvature in the plate, and when so set to be continued in their motion in the same position or inclination. The pinching rolls are driven at the opposite ends by powerful gearing and independent pulleys, so that each is at all times driven to the best advantage, without any calendering motion, as when both rolls are driven from one belt and one set of gearing. There are two driving pulleys, one at each end of the machine, and these pulleys, 40 inches in diameter and 8 inches face, must run at the rate of 120 revolutions per minute. Separate belts, open and crossed, are used to drive the adjusting machinery. The rolls will bend plates in-wind or straight while passing straight through the machine. Can also be used to straighten or flatten buckled plates.

**Will bend 1-inch plates.**

IN bending plates for ship work, not only is required to bend heavy plates, but they must be bent in-wind to suit the shape of the ship's side. The design of ship bending rolls given in the above specification is adapted to bending or straightening plates of iron 1 inch thick and 14 feet wide. The curvature can be made regular or in-wind, the plate in either case passing directly through the machine, not diagonally. The great weight of the rolls necessitates the moving of all parts of this machine by power. In

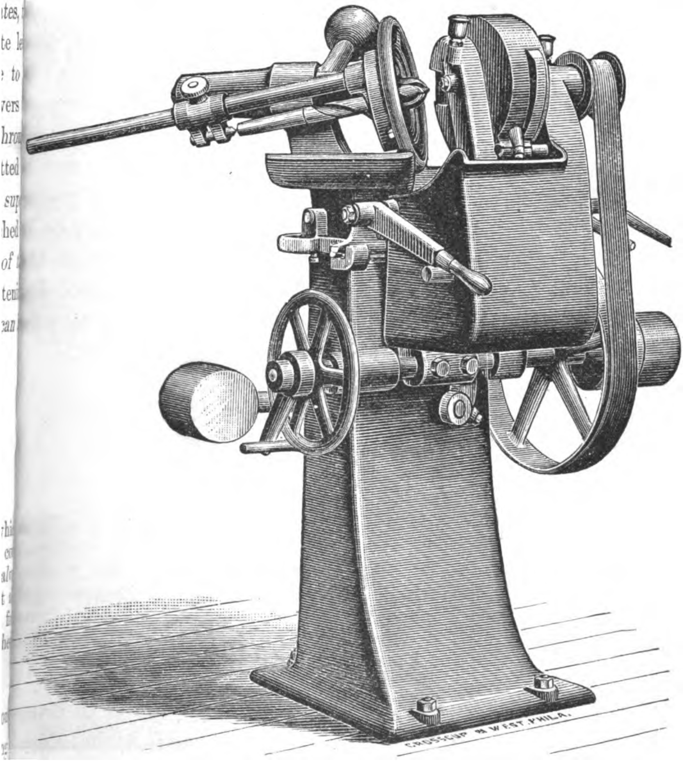
**How to straighten plates.**

using the machine to straighten buckled plates, bending rolls are set so as to take the plate le without bending, and the parts of the plate to stretched, to free it from the buckle, have slivers sheet iron placed on them, when in passing throu the pinching rolls these parts will be submitted greater pressure, due to the thickness of the supe imposed slivers of sheet iron, and will be stretched such places,—a very little practice on the part of t workman enabling him to effect the ready straighteni of plates in a better and quicker manner than can accomplished by hand hammers.

## CUPOLAS FOR FOUNDRY PURPOSES.

With cast iron foundation plate supporting the columns which carry the cast iron base plates and doors for discharging waste contents, after heat; wrought iron case, wind chambers and valve, charging door and elbow to chimney so arranged as to deposit all the cinder at base of chimney. The whole fitted complete, with fire brick ready for lining the curved portion immediately above boshes. Diameter of boshes: 24, 30, 36, and 42 inches.

A VERY excellent form of cupola, simple in construction and giving a good result in melting. The interior is of a shape to hold the lining with certainty, and to permit the placing of the tuyeres in any required position in the circle and of any number.


CROSSCUP & WEST PHILA.

**WILLIAM SELLERS & CO.'S PATENT DRILL-GRINDING MACHINE.**

**1st.** Holds in the same chuck and in precisely the same manner all kinds of drills, either flat or twist, from one-quarter inch in diameter up to two inches, without requiring any bushings.

**2d.** It grinds the proper amount of clearance to every part of the cutting edge of the lips. This is theoretically correct on a small drill as well as on a large one.

**3d.** The lips of the drill form the index to fix the cutting edges in the chuck. This method of placing and of holding the drill insures each lip being ground with the same length of cutting edge.

**4th.** Adjustable to any angle of drill-point, from 90 to 130 degrees included angle.

# WM. SELLERS & CO.,

*1600 HAMILTON STREET, PHILADELPHIA.*

**NEW YORK OFFICE, 79 LIBERTY STREET.**

MAKERS OF

**Boring and Turning Mills.**

**Boring Bars for Locomotive Cylinders.**

**Boring Mill, for Driving and Car Wheels, with Universal Chuck.**

**Bolt Screwing Machines, of Patented and Most Improved Design.**

**Bending Rolls.**

**Cranes, for Foundry and other purposes, Hand, Steam, or Hydraulic.**

**Travelling Moulding Cranes.**

**Cupolas for Foundries.**

**Cylinder Boring and Facing Machines.**

**Drill Presses, Vertical, Horizontal, and Radial.**

**Universal Drills.**

**Cotter Drills.**

**Drill Grinding Machines.**

**Hydrostatic Wheel Presses.**

**Hand Forcing Machines.**

**Automatic Gear Cutting Machines.**

**Grindstone Boxes.**

**Hoisting Machinery.**

**Steam Hammers.**

**Self-Acting Slide Lathes.**

**Driving Wheel Lathes.**

**Chasing Lathes for Brass Work.**

**Improved Axle Lathe.**

**Geared Foot Lathes.**

**Milling Machines.**

**Patent Planing Machines.**

**Punching Machines.**

**Riveting Machines, Steam and Hydraulic.**

**Shearing Machines.**

**Shaping Machines.**

**Slotting Machines.**

**Straightening Machines.**

**Railway Turning and Sliding Tables and Pivot Bridges, &c.**

---

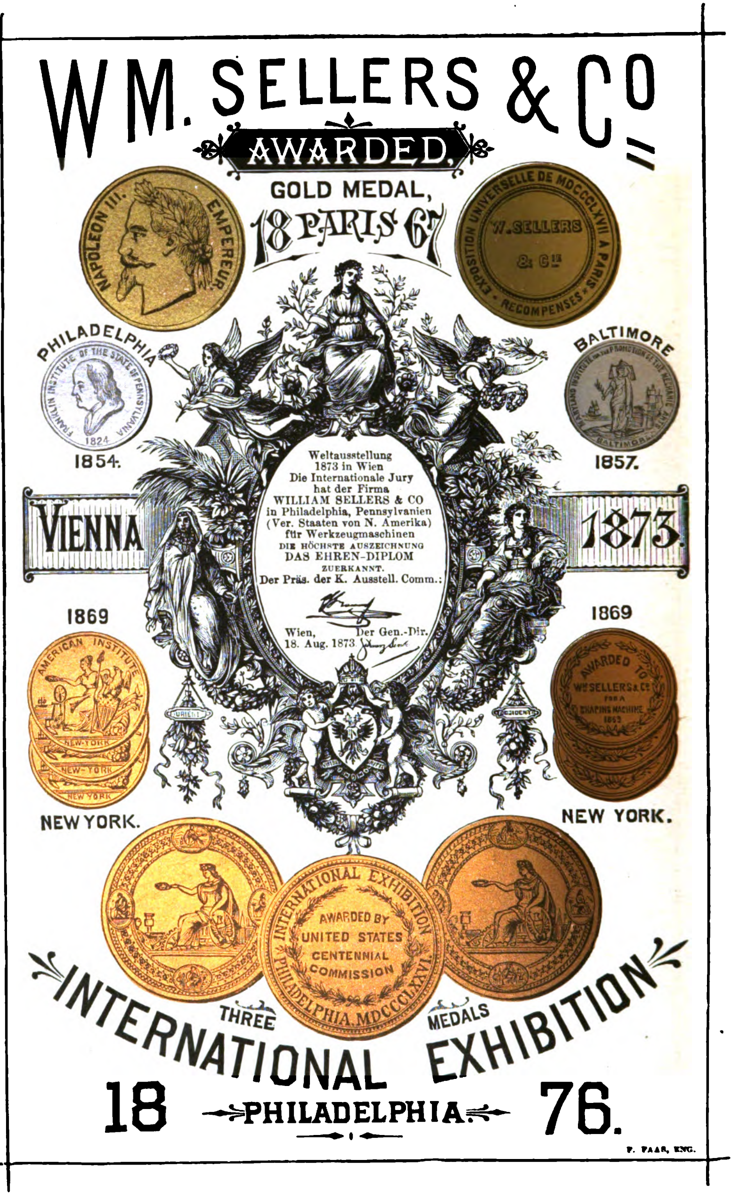
MANUFACTURERS OF IMPROVED

## SHAFTING AND MILL GEARING,

PNEUMATIC FIRE EXTINGUISHERS, requiring no Chemicals,

AND SOLE MAKERS OF THEIR PATENT

**INJECTORS FOR SUPPLYING STEAM BOILERS WITH WATER.**


NAPOLEON III. EMPEREUR
EXPOSITION UNIVERSELLE DE MDCCCLXVII A PARIS
W. SELLERS & Cie
RECOMPENSES
FRANKLIN INSTITUTE OF THE STATE OF PENNSYLVANIA
1824
MARYLAND INSTITUTE FOR THE PROMOTION OF THE MECHANIC ARTS
BALTIMORE
ORIENT
OCCIDENT
AMERICAN INSTITUTE
NEW-YORK
NEW-YORK
NEW YORK
AWARDED TO WM SELLERS & CO FOR A SHAPING MACHINE 1869
INTERNATIONAL EXHIBITION
AWARDED BY UNITED STATES CENTENNIAL COMMISSION
PHILADELPHIA MDCCCLXXVI

# WM. SELLERS & CO.

AWARDED,

GOLD MEDAL,

18 PARIS 67

PHILADELPHIA
1854.

BALTIMORE
1857.

VIENNA 1873

Weltausstellung
1873 in Wien
Die Internationale Jury
hat der Firma
WILLIAM SELLERS & CO
in Philadelphia, Pennsylvanien
(Ver. Staaten von N. Amerika)
für Werkzeugmaschinen
DIE HÖCHSTE AUSZEICHNUNG
DAS EHREN-DIPLOM
ZUERKANNT.
Der Präs. der K. Ausstell. Comm.:

Wien,
18. Aug. 1873.
Der Gen.-Dir.

1869
NEW YORK.

1869
NEW YORK.

THREE MEDALS

INTERNATIONAL EXHIBITION

18 76.

PHILADELPHIA

F. PAAR, ENG.